

THREE

Organizing Human Resources and Contracting

Once a project has been established and the goals are set, the project manager has to act to achieve these goals. Since a manager gets things done through others and also since most projects are multi-disciplinary, a project manager has necessarily to look around for help. This help can be expected both from internal and external sources; internally, from within the institution which employs the project manager and externally from various institutions and individuals having competence and skills relevant to the project under implementation. The extent to which a project manager needs to look outside his own institution for help will depend on many considerations. However, one thing is certain that it is simply not possible to execute a complex industrial project without involving outside agencies and delegating authority to them.



DELEGATION

Delegation is considered essential when one has to be at more than one place and doing more than one thing simultaneously. A manager at his individual level can achieve this by entrusting some task to the care or *management* of his subordinates. In project management delegation has to take place not only at the individual level but also at the institutional level. An organization desirous of executing a project will be required to delegate authority to the project manager commensurate with the tasks entrusted to him. The project manager, in turn, may entrust a part of his task to insiders and part to outside organizations having requisite skills for *management* of the same. Each time he has to delegate authority necessary for the accomplishment of the tasks.

It is interesting to note that the reasons for delegation, the process of delegation as also the expected outcome from delegation are almost the same with individual as well as institutional delegation. But delegation at the individual level and with insiders is known more for various lapses, and if the same is allowed to perpetuate at the institutional level it may be disastrous for any project. We should, therefore, examine what goes wrong with delegation at the individual level so that the same is avoided when delegation is institutionalized.

The issues relating to delegation which need close scrutiny are:

1. What to delegate?

2. When to delegate?
3. How to delegate?

What to Delegate

Delegation does not take place when a project manager is merely asked to go ahead with a project without authority. The project manager, in that case, is being merely asked to do a task and not *manage* a task. He cannot be expected to assume responsibility nor held accountable for results. He has nothing to sub-delegate nor can he demand results from others.

Authority delegation to project managers may vary as shown in Fig. 3.1. Most literature on project management has considered only five variants but this, as one can easily appreciate, is done only to limit the variations for the purpose of discussion. Otherwise except for situations 1 and 5 there would be as many variants as one would like it to be. We will discuss these variants, their merits and demerits at a later stage, but at the moment let us address ourselves to the basic issues of delegation.

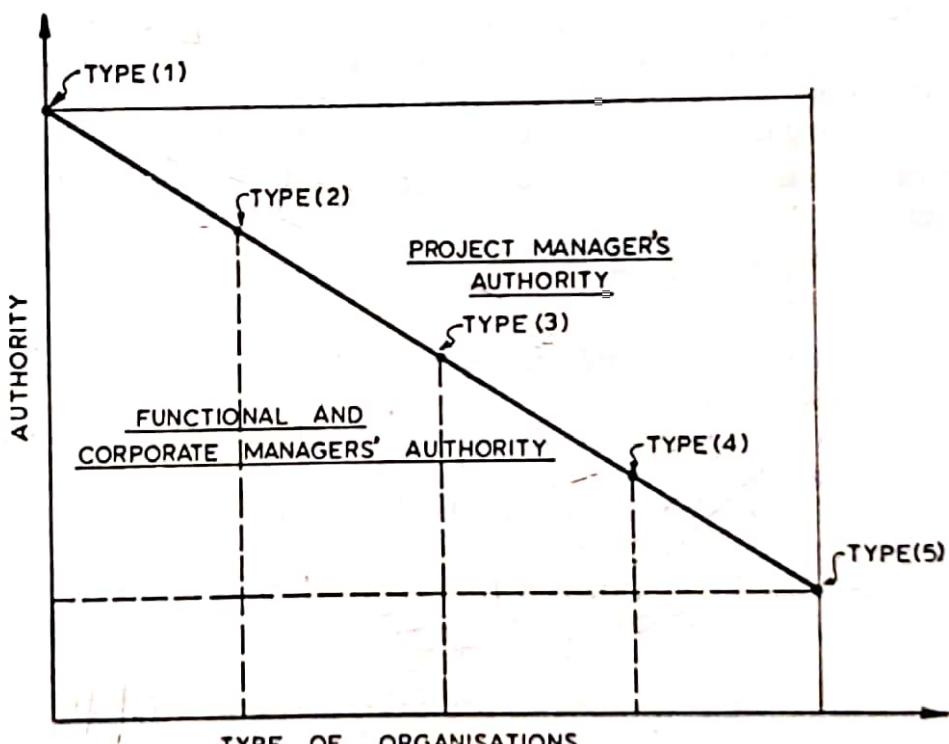


FIG. 3.1 Project manager's authority (See Table 3.1)

Let it be clear at the very outset that assignment of any task is not delegation. Delegation occurs when *authority* is formally passed on. Authority has to be granted to make commitments, use resources, issue instructions, demand adherence and take necessary actions for the performance of tasks. As far as possible delegation should be in writing, and in case of institutional delegation this should *always* be in writing. It is true that some authority can be acquired by individuals by virtue of personal qualities and technical competence. However, this can rarely happen between institutions. Institutional delegation has not only to be in writing and appear formal but should contain legal overtones too.

When authority is delegated a managerial position is created. The recipient of the authority now becomes a manager and can be expected to perform managerial functions. But mere assignment of the task and delegation of authority will not ensure performance unless the recipient considers it his moral obligation to produce results. This is what all of us refer to as *responsibility*, and it must have become clear by now that this is not a thing which can be delegated in writing—this is something which one undertakes by himself. Though one may legitimately expect responsibility to be passed on concurrently with delegation of authority, yet it may not necessarily happen this way. Responsibility is an attitude of mind which cannot be passed on in writing; and to that extent the delegator, whatever authority he may pass on, will still be responsible for the tasks from which he cannot absolve himself.

So responsibility cannot be delegated, but only authority can be delegated, and to the extent necessary for the accomplishment of the task. And since authority, like money, has to be used for a cause, it must likewise be accounted for in order to ensure its best use. This is referred to as *accountability*. So when authority is delegated, the delegate remains accountable to the delegator about the use of the authority. This can ensure compliance of the delegator's plans and directives and enable the delegator to discharge his responsibilities. Further, because the delegatee is accountable, he invariably assumes the responsibilities matching the extent of authority he receives. Where this does not happen, rather than withdrawing authority the incumbent should be replaced; for authority, as we have discussed, is essential for the accomplishment of the task.

When to Delegate

Delegation, whether institutional or individual, enhances one's capability of doing things. One stands to gain from delegation—

1. When one is simply overburdened and cannot handle all the tasks in the required time though one has the know-how;
2. When one does not have the know-how and is not interested in building up the same as it may not be of any use in future;
3. When the job is so specialized that it is either not possible to build up the capability or build it by the time it is needed;
4. When someone can do it better qualitatively, economically and on time;
5. When the work is not secret, or when delegation will not cause problems even if it is a secret;
6. When the intention is to develop staff or growth of ancillary organizations and there are capable individuals and organizations available; and
7. When the work is routine and the delegator's time can be more profitably utilized by diverting his attention from routine areas.

In practice, however, delegation may not take place even though the situation may be ideally suited for delegation. Project managers may not be delegated requisite authorities which, in turn, may reduce them to dummies incapable of functioning effectively. Some owner organizations may attempt doing everything themselves. They may even build up a full-fledged project engineering division even though they may not have further projects in the pipeline and their main business is only the operation of the plant and not engineering of the same.

The problem is not unique only with the delegators; equally present is the reluctance to receive delegation. A project management company may not like to accept whatever an owner may like to delegate. The same is true with vendors and contractors.

The problem of delegation, particularly in the project management context, is not so much behavioural as it is elsewhere. The problems which one has to often confront in a project management situation are:

1. What tasks to retain and what to pass on? What authority needs to be delegated for the performance of the tasks being passed on?
2. How to package the work satisfactorily so that there is no overlap and also nothing is left uncovered?
3. How to establish the trustworthiness of the delegatee with whom no working relationship ever existed in the past?
4. How much authority can be shared without risking failure? How to make the delegatee fully accountable morally and legally?
5. Will the delegatee assume responsibility matching the authority delegated? If not, what could be done to make him see reason?
6. Which controls to be installed? Would the procedures for control be acceptable to the delegatee? Would the controls in any way inhibit the initiative of the delegatee?
7. How could the interventions be planned so as not to be considered as unnecessary interferences by the delegatee?
8. How to ensure continuous flow of communication and how to make it prompt, accurate and to the point?
9. How to motivate the delegatee to assume total responsibility and give best performance commensurate with the authority delegated?

Luckily, however, the problems are not unsurmountable. We will discuss these later in this chapter in connection with contracts and contracting.

How to Delegate

To get the most from delegation, the delegatee must be given a complete picture of what he has to do, how to do it and how much authority he has to get it done. It is also necessary that the entire thing is put on record as otherwise the delegatee would not know what the delegator has in mind and also the basis for accountability will not be established. It is also quite possible that one might overstep the authority delegated, not necessarily in his anxiety to get a task completed faster or better, but merely to satisfy his egoistic needs or hunger for power. Only written delegation can provide the delegator the power to discipline the delegatee should the occasion so arise.

Since the delegatee is expected to accept responsibility, delegation cannot be just an unilateral act of the delegator. The delegator has to pass on requisite authority, but the delegatee must agree that the authority is adequate for the task he is being asked to complete. Also, since responsibility is a matter of attitude, unless a process of negotiation precedes delegation, it is not very likely that the delegatee will assume the desired degree of responsibility. If the delegatee is unwilling, delegation will simply remain on paper and fail to deliver the results.

Delegation, whether at individual or institutional level, involves a certain amount of bargaining. The delegator may like to pass on a 'hot potato' but the delegatee would not

like to accept it unless the return would more than compensate the trouble. However, what the delegatee would consider adequate compensation may vary, and unless the delegator has a few options it may indeed call for tough bargaining.

Delegation, thus, is not a simple and a casual affair. To realise best results both the delegator and the delegatee must have a proper appreciation of what is to be delegated, when delegation is called for and how delegation has to be made. If delegation is not properly done it may boomerang on the delegator, and instead of helping will hinder the progress of work.

PROJECT MANAGER'S AUTHORITY

A project manager must make decisions to guide the actions of others. This, in brief, is his authority. A project manager, in the first instance, must have authority to enable him, in turn, delegate it to others. But what must be his authority? Should it be absolute or shared?—these are some of the important issues which must be considered for the successful implementation of a project.

The authority required in project management is for dealing with:

1. Project scope
2. Project goals
3. Project execution mode
4. Project organization
5. Project purchase
6. Contracts, contractors and consultants
7. Project technical performance
8. Project schedules and budgets
9. Fund and other resources
10. Project personnel
11. Public/Shareholders
12. Project environment
13. Management systems and procedure
14. Project performance review

It can be easily understood that on some matters the project manager will have no authority, and on others he may either have absolute authority or share with corporate and functional managers. This can also be understood from Fig. 3.1 which shows that there could be a range of possibilities for authority sharing. Therefore, unless there is some documentation about the project manager's authority, there is bound to be some confusion. This would partly explain why project managers in different organizations may function differently. Even in the same organization two project managers may not be able to function identically if some minimum documentation does not exist.

For a company executing projects either regularly or for the first time, it would be necessary for the chief executive to issue what may be called a *project charter* soon after the project manager is appointed. The charter, at its minimum, may define the project scope, the project goals, name the project manager and his directing authority, name the project reviewing authority and request cooperation of all concerned in the execution of the project. An elaborate effort in this direction may produce what is known as a *project manual*. We

shall discuss the project manual in detail in Chapter 5. Only the naive would believe that problems relating to authority get resolved once a project manual is prepared.

PROJECT ORGANIZATION

An organization chart, in most cases, is the simplest and quickest way to demonstrate the project manager's authority. Details such as where a project manager is positioned, to whom he reports, those with whom he communicates, and all those who report to him, will tell much about a project manager's authority though not in very clear terms,

Project Manager as a Staff Assistant to the Chief Executive

A project manager may be positioned in many situations, and in each case the authority he can wield and consequently the end results he can produce will be different. Figure 3.2 shows one arrangement in which the project manager virtually has no authority. He serves, at best, as a staff assistant to the chief executive. The project manager, in this position, does not make any decision for the project, nor does he provide any staff service to the functional departments who make all the decisions relating to the project. The project manager merely collects information—collects and communicates the same to the chief executive. This arrangement may be chosen by a chief executive who wants to directly control the project but cannot devote much time to keep track of details.

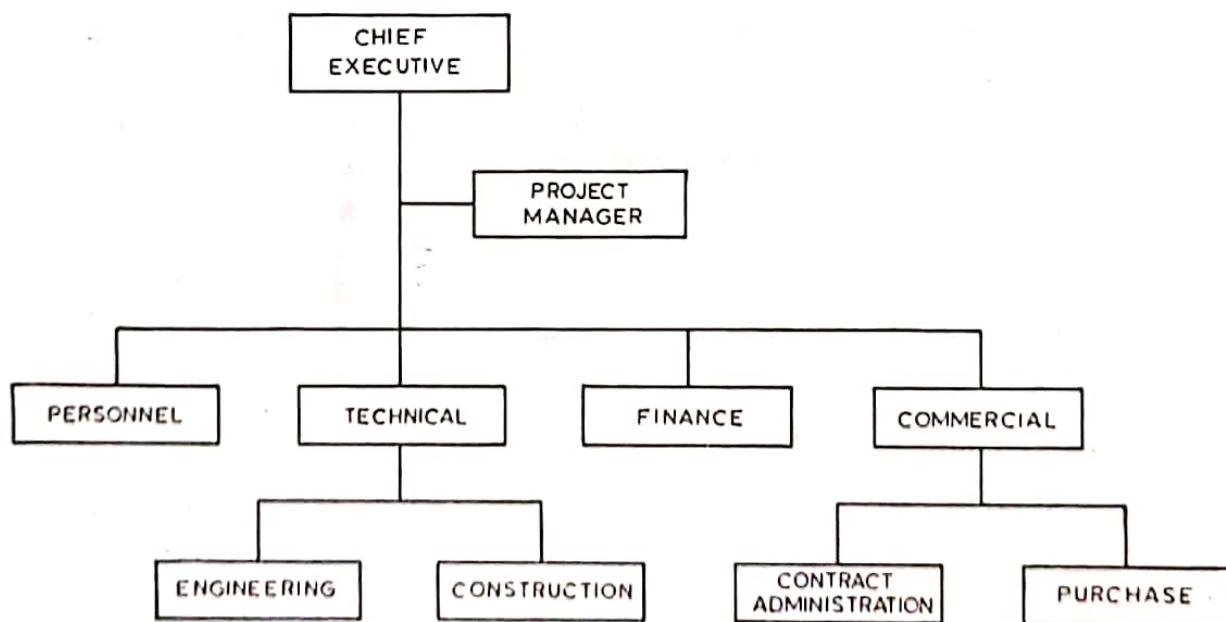


FIG. 3.2 Project manager as a staff assistant to chief executive

The chief executive may expect the project manager to coordinate and expedite the project which the latter will find a very trying proposition in view of his not having any authority. He may influence some decisions taken by the chief executive or by the functional departments, but he cannot himself make any decision which can become binding for others. In other words, he has to rely on *personal authority* for getting things done and not on *positional authority*.

This arrangement may work for very small projects. It cannot work for large projects even if the project manager is provided with supporting staff since the real person, who in this arrangement wields authority and can, therefore, coordinate and expedite the project is the chief executive who, as stated earlier, may not have much time for the project.

Consultant as Project Manager

An alternative arrangement leading to a somewhat improved effectiveness could be to retain a consultant to advise the chief executive in project implementation. The consultant would be an outsider without any authority. He will definitely be able to influence the decisions of the chief executive and also those of the functional executives, but he does not take decisions for others to execute. His task would be to collect information, collate and communicate to the chief executive, as in the earlier case, and may add his own recommendations. The chief executive, *ipso facto*, remains the project manager. What he gains in this arrangement is an added piece of recommendation which should be authentic, reliable and impartial. What he may miss in this arrangement is the informal communication and direction the staff project manager could have given to the functional executives by assuming certain authority in view of his closeness to the chief executive.

In the light of our earlier discussions, it is clear that there is no project manager in either of the arrangements, irrespective of whatever designation one may attach to this staff position. That this arrangement may work well in some cases is besides the point; what we see here is a case where a project manager does not have any authority delegated to him and, therefore, all consequences of non-delegation should be the logical outcome of such an arrangement.

Project Management as a Specialized Staff Function

In contrast to the arrangements discussed above, a project manager may be engaged to render specialised staff service to all other functions in the company in relation to a project. The project manager in this role provides schedules, budgets and information to the various functional departments who will execute the project. The project manager, in this case, will be a specialist in project management tools and techniques, and in view of his superior knowledge relating to scheduling, budgeting and information systems, he is in the best position to advise other functions. A project manager in this role can also carry out service activities like collection and transmission of data, follow-up of one functional group to service another group, maintain records, measure progress, analyse progress and prepare progress reports. He may also act as a single focal point regarding communication between various participating functions and between his company and other interacting companies.

It is to be noted that in each case, while he performs a service for the participating functions, he does not take any decision for them. Nor does he direct the various functions such as how schedules, budgets or technical coordination are to be achieved. He may advise the functional groups but a final decision would rest with the functional groups. He does not, therefore, have any authority which can shape the destiny of a project.

Figure 3.3 shows such an arrangement. Most companies tend to use this arrangement when project management is used for the first time in the company as this does not require much change in the working of the organization. It is, of course, quite another thing whether

the objectives of project management are achieved by this arrangement; but it is for the first time that a single spokesman for a project is created.

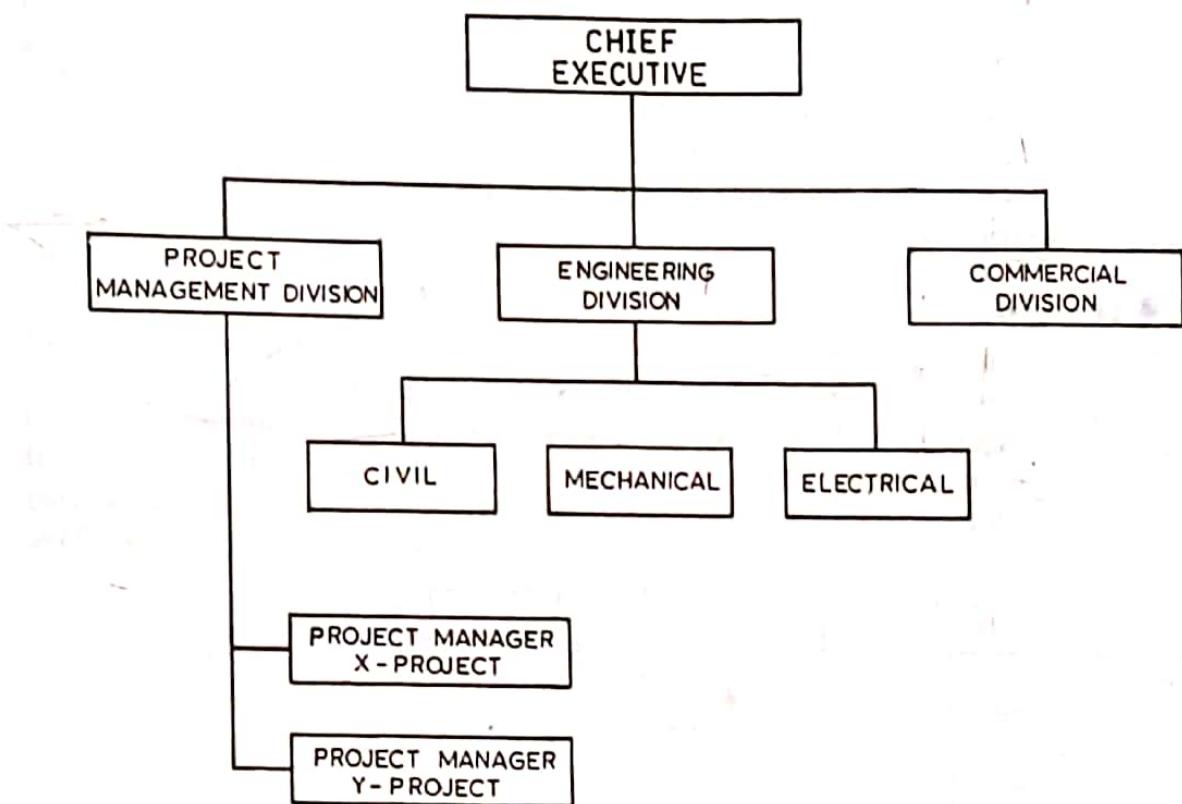


FIG. 3.3 Project management as a specialised staff function

[It is also interesting to note that a project manager in such an arrangement fully identifies himself with the project and considers himself responsible for its successful completion. However, the fact remains that at times of adversity the project manager, in such an arrangement, is liable to throw up his arms and declare that he could be held least accountable for fulfilment of the project goals as he hardly had any voice in its execution.]

The drawback in this arrangement is that while a great deal could be expected, not much may be delivered. The project manager would expect to be heard, but he might not be. The management would expect the project manager to succeed, but he might not. The functional managers would expect him to take all the responsibilities without any authority, but he cannot. Yet, as has been mentioned before, it will be for the first time that someone other than the chief executive will claim a project as his own and work as best as possible for its success.'

It is quite possible in this arrangement to encourage direct communication with the work force, or the source where work is being done, without going through the lines of authority. This arrangement, however, would not entitle the project manager to issue instructions to the work force howsoever senior he may be in the organizational hierarchy. Any instruction has strictly to come from the functional base irrespective of whether it relates to schedule, budget, information system or coordination with other functional groups or outside agencies.

This direct approach, though devoid of any authority, may not get automatically accepted unless this has the backing of the chief executive and in course of time becomes an

organizational practice. Yet if lines of communications are not made direct, there would be inordinate delay and much of the advantage that could be expected from the arrangement would not be there.

Where a direct communication link is available, where the work environment is congenial and participative, and where everyone considers himself responsible for the success of the project and cooperates with each other for the cause of the project, the issue of project managers' authority does not become very important. But unfortunately the real world is rarely so ideally organised. Therefore, organizational protocol and issues like authority can hardly be wished away.

Matrix Organization

Even though in the arrangement shown in Fig. 3.3 a project manager is not formally granted any authority, sooner or later, if the set up continues, a competent project manager will succeed in acquiring some authority because of his sheer identification with the project and its cause. To the extent a project manager is able to acquire the authority, the functional managers will be forced to dispense with the same. When this arrangement of sharing authority between a project manager and other functional managers is formalized, we have an organizational form which is known as *matrix organization*.

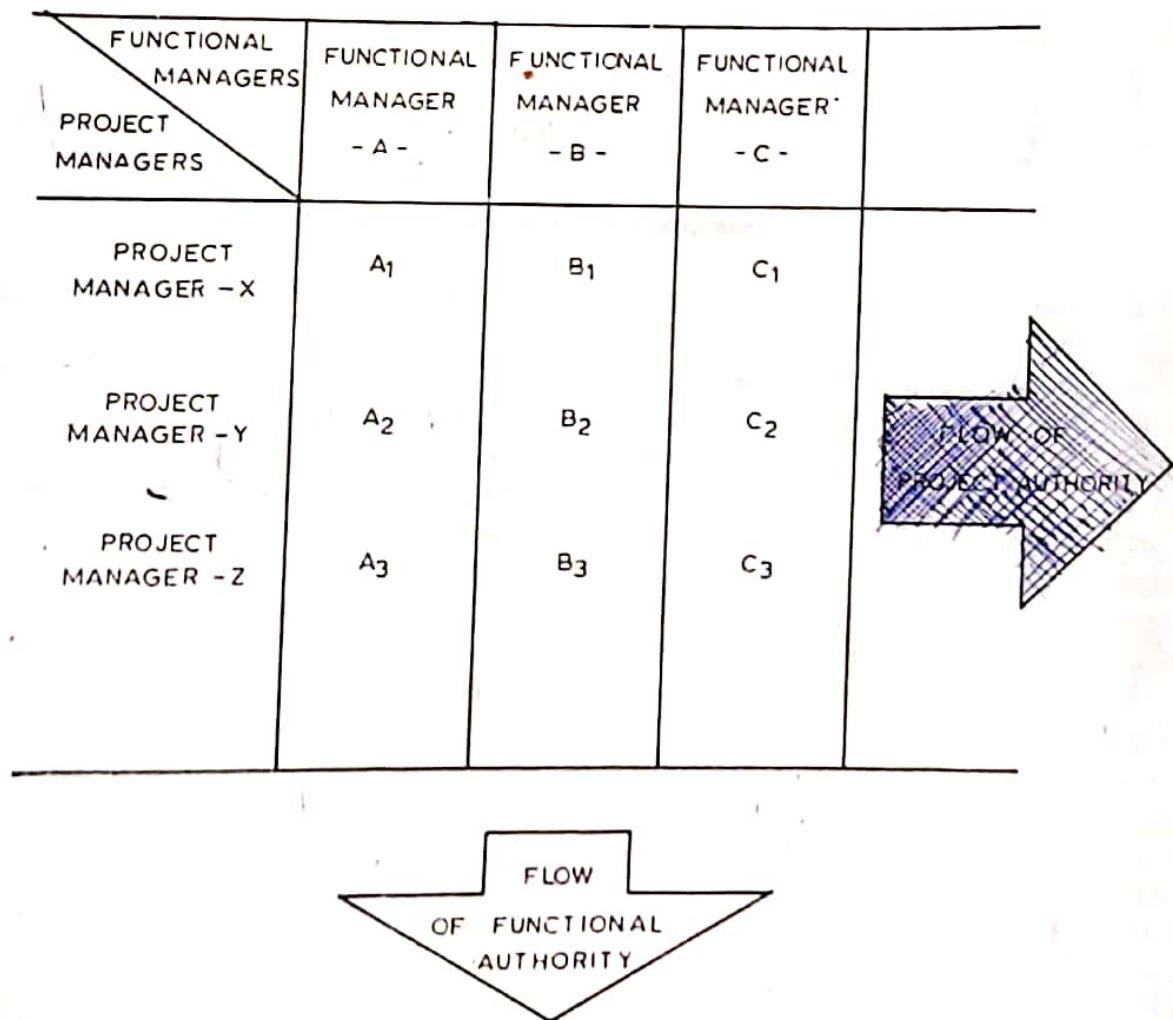


FIG. 3.4 Concept of matrix organisation

A matrix, as shown in Fig. 3.4, is a concept borrowed from algebra where an individual will abide by the decisions made by two superiors—one belonging to the project and the other to the specialised function. One will be his direct line boss and the other his project boss. Both are responsible for the successful completion of the project and, therefore, both ought to have authority over the working force through whom the project is being executed. Figure 3.5 shows a matrix organization.

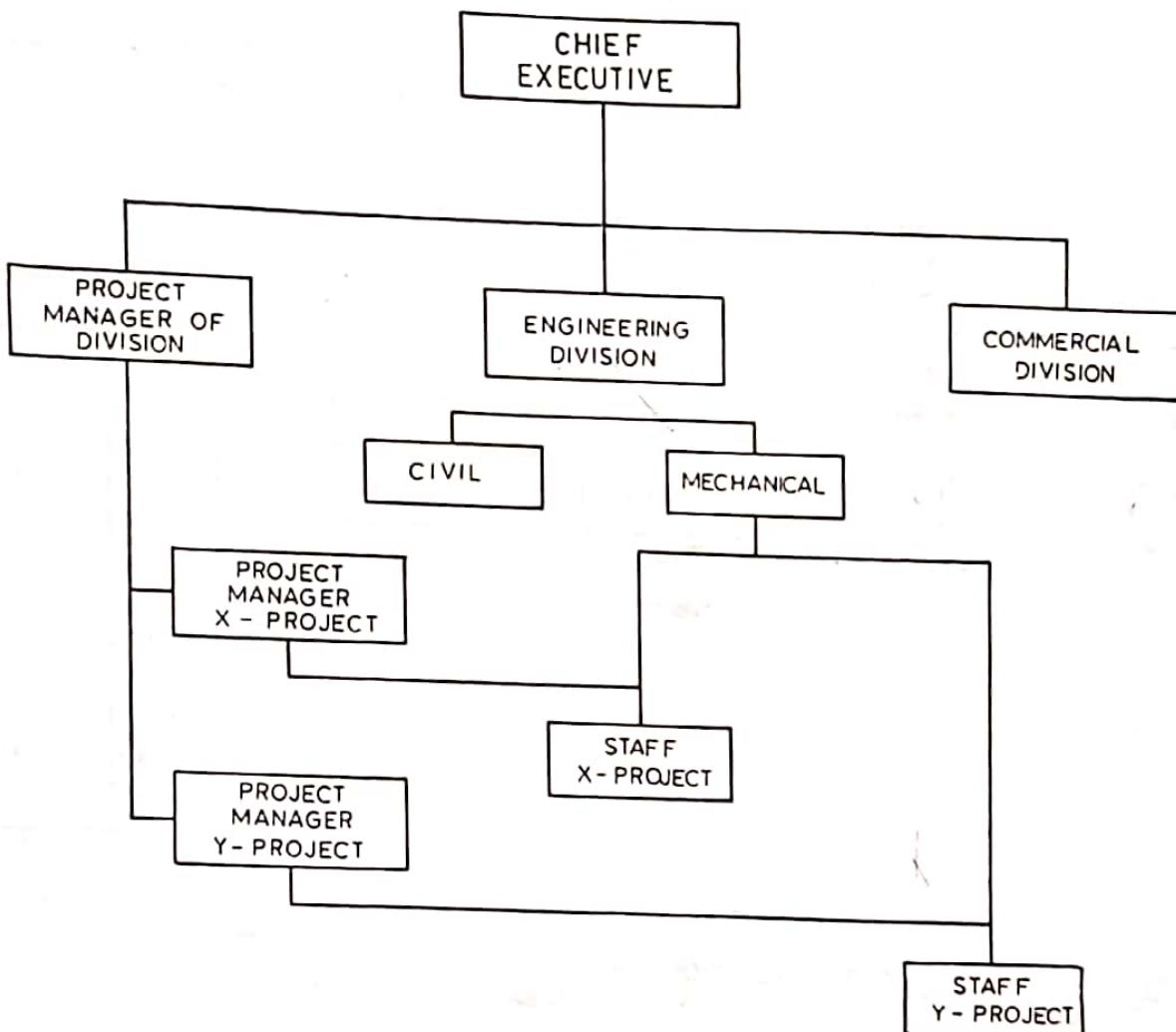


FIG. 3.5 Matrix organisation

To those who are used to a single reporting relationship this may cause some confusion. However, since childhood every one is used to a dual reporting relationship, and where there is tacit understanding between the parents, nothing goes amiss. Industrial organizations, no matter how much one may propagate the family concept, will not have the same adherence as on the domestic front, but the proposition can still work if there is a clarity of roles. For that matter, even on the domestic front, if the parents are not mutually supportive the child cannot have the best possible development. A *mutually supportive* relationship should exist between the partners in a matrix set up for the successful execution of a project.

No one needs to flaunt positional authority to get work done; that would be a crude

approach unbecoming of modern managers. As K. Okuri, vice-president of Nippon Rica, Japan, puts it, the chair remains at the back in dealing with work in an office, only the table remains in the front. But one needs both chair and table to do any work. Matrix organization is, thus, a deliberate attempt to provide authority, i.e., a chair to those who are asked to assume responsibility, and as long as one does not put one's chair before one in dealing with work, there should not be any problem.

In fact, if we examine the contractual situation shown in Fig. 3.6, where an external agency is contractually bound to accomplish certain tasks, it can be seen that the contractor's work force is under dual control. The matrix is clearly in operation. Some conflict and confusion is inherent in the arrangement, but the parties must assume a mutually supportive role or else the execution of the contract will not be smooth.

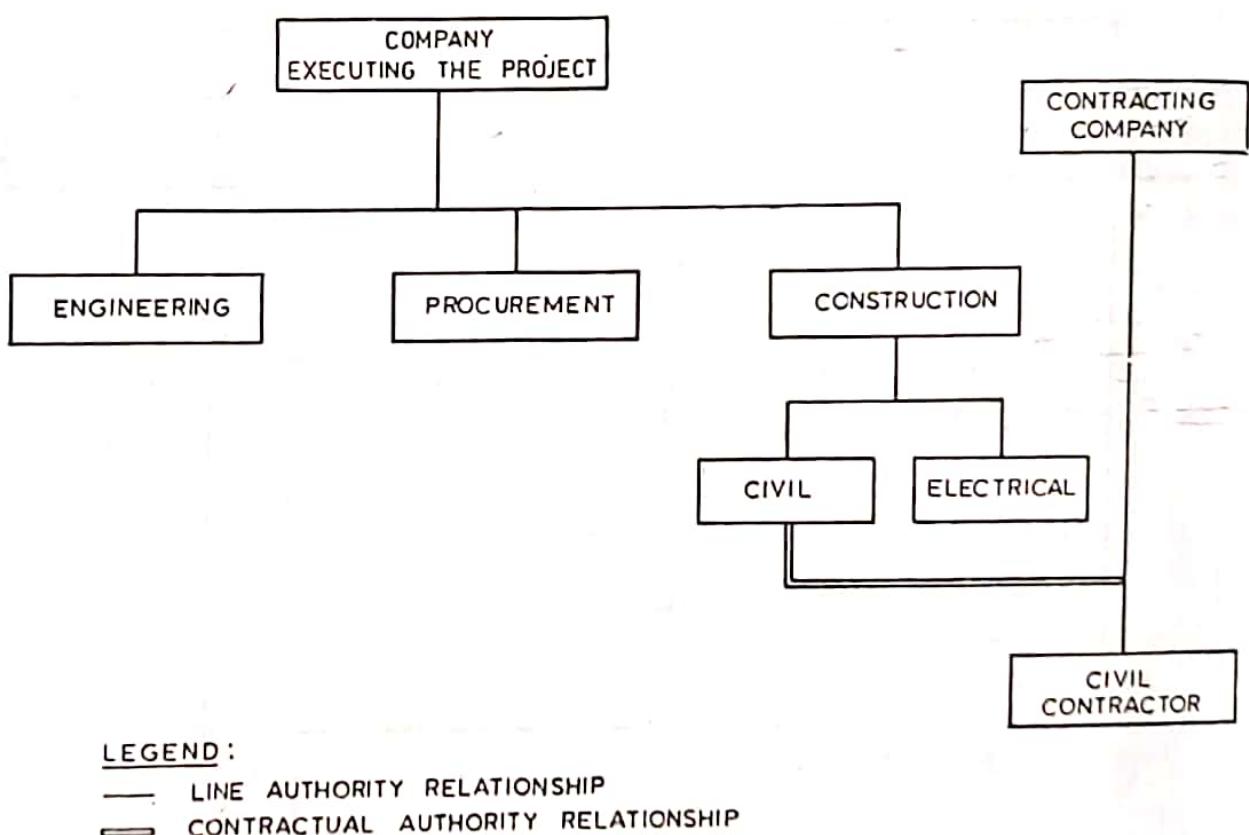


FIG. 3.6 Matrix arrangement in operation in execution of contracts

Inherent in th. matrix operation is the concept that the parties involved in the matrix will have a common concern as well as a specialist concern. As long as the parties respect the *specialty* of the others and look to one another for help and support for the common cause, a matrix will work extremely well. But if one assumes that what should have been a common cause is not common, and also believes that help would not be forthcoming unless the other party is forced, a matrix is unlikely to succeed.

Ideally one would like to see both the parties as understanding, mutually supportive and not trying to overtake each other. If the matrix ever operated at that level, the arrangement can be called a *balanced matrix*. Much as one would like to see a matrix remain balanced, it may not remain so not merely because of the personality factors of the partners but because the company may not want it to remain balanced.

Thus, a matrix may be filled either to the project side or to the functional side depending on circumstances. If the project influence is more in decision-making for the project, then the arrangement is considered a *strong matrix*. On the other hand, if functional departments are seen to be influencing the decision-making more, the arrangement is considered a *weak matrix*. While a company may operate on matrix, one may see it operating with different strengths in different projects.

Referring to the domestic matrix, the mother is supposed to concentrate on the home and the father on the career. It works in a similar manner in a project too. The functional departments provide the individuals with expertise for projects to use, and a home to return to when the expertise is no longer needed by the project. The project merely requisitions the expertise and directs its use in the best interest of the project. So the project should decide what is to be done, when it is to be done and at what budget; it should be for the functional departments to decide who should do it, what back-up he should be given, what norms and standards he should follow so that the work is completed as per required specifications and within the time and budget.

Trouble normally starts when the functional departments would not take up the work that is needed first or would not deploy resources to do it within the time and budget. The worst may happen when resources are withdrawn without the project manager's prior knowledge. When things occur as above, the arrangement no doubt is a weak matrix. On the other hand, if the project manager starts deciding who should work for them, encourages violation of functional standards and norms, gives technical decisions without consulting functional departments, does not allow withdrawal of staff for training or optimum utilization of the potential of the concerned staff, then the arrangement is stronger than a strong matrix. In either case the company executing the project is not going to get the best from its people.

But such problems are very real in the operation of a matrix. It may be weaker than the weakest acceptable or stronger than the strongest desired. A *balanced matrix* where there is a balance of power between the project manager and the functional manager is an ideal but non-existent situation. Therefore, many people consider a matrix a complex organizational arrangement and would like to avoid it, if possible.

Task Force Organization

An alternative arrangement which clearly accords authority to the project manager and avoids disillusionment of either the project manager or the functional manager due to maloperation of the matrix is a *task force*. In this arrangement the project manager is delegated the full authority to make decisions for the project, but he would be required to operate within the functional organization's policies and procedures. There is clearly no intervention from the various functional departments, no dual decision making and no dual reporting relationship for the working force; the project manager makes all the decisions but within the policies and procedures laid down for him.

A task force is created by drawing personnel from various functional departments and putting them under the project manager. The staff so assigned will continue to receive administrative support from their home departments but they will respond only to the project manager. While they will receive all directions from the project manager, they will be required to follow the home organization's policies and procedures. If there are directions from the project manager asking violation of functional policies and procedures, the task

force will notify both the functional head and the project manager. The functional manager may either accord approval or take it up with the project manager. The matter obviously will move up in case the functional manager and the project manager cannot settle it between themselves. On the other hand, there may not be any reference at all to the functional manager or corporate management, if the project manager sorts it out at his level by taking the functional staff into confidence whenever decisions are made.

Figure 3.7 shows the task force arrangement. The project manager's authority is indicated by the lines and the dotted lines show the relationship between the functional staff and the functional manager. The relationship shown by the dotted line enables communication of the functional staff with their respective functional departments for obtaining technical support or additional staff support but no decisions relating to the project. It is also necessary that communications to functional department should be through the project manager. Similarly, all communications from the functional department to its staff loaned to the task force has to be through the project manager only. There is no direct linkage between the functional staff and their home organization.

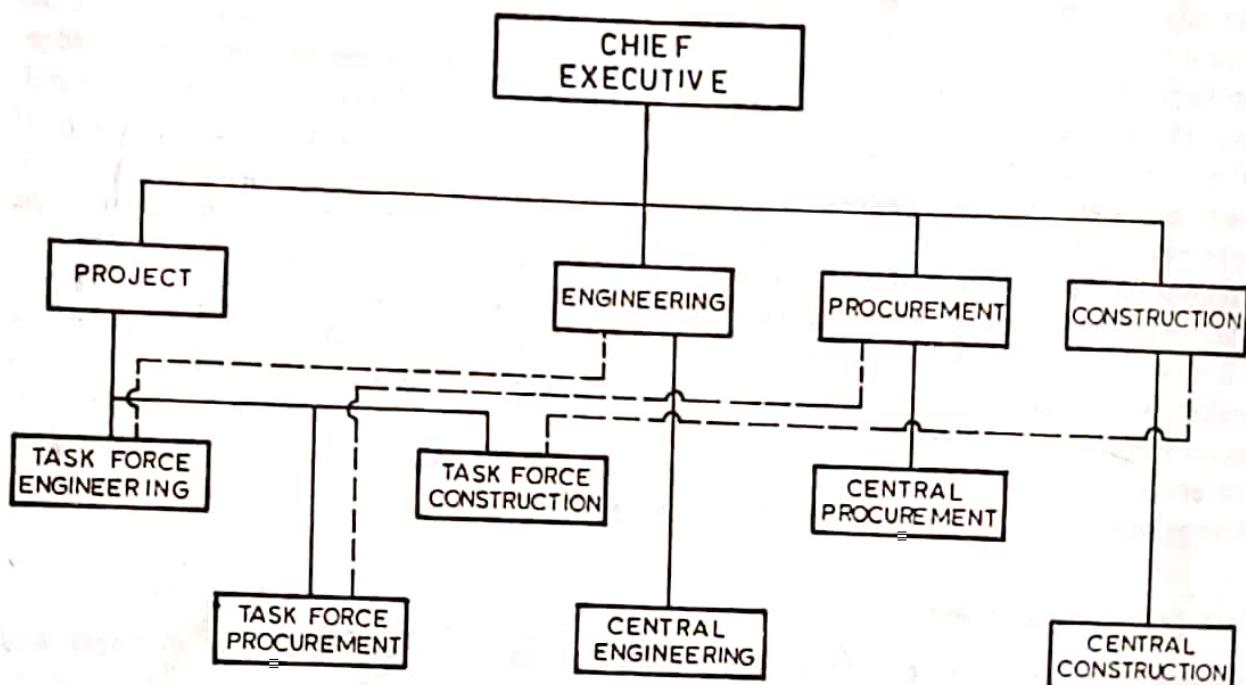


FIG. 3.7 Task force arrangement

Unlike the matrix the loyalty of the functional staff in this arrangement is clearly with the project. The functional department's influence is virtually non-existent. Therefore, unless the functional representatives have strong functional commitment, functional excellence is likely to be compromised for expediency. The functions will require strong corporate management support to ensure adherence to policies and procedures laid down by them.

This arrangement, as can be seen, is just the opposite of the arrangement shown in Fig. 3.3. Functions in this arrangement have been relegated to the staff position and the project has assumed the dominant line role. Naturally, the time and cost objective of the project will receive the best attention in this arrangement, but one cannot be too sure about the quality

objective. The project with this arrangement moves very fast, and that is the single dominant reason why many people would prefer a task force arrangement.

There may not be any real risk in going for a task force arrangement if the technology for the project is simple, and the project is also small. The functional staff in that case need not be top specialists; one specialist may cater for multiple disciplines. This ensures maximum utilization of specialist time which is normally not expected to happen in a task force arrangement.

However, it may not always be possible to create task forces because of shortage of specialists who can be assigned to task forces. Also, large and complex projects have complex problems, solution of which requires involvement of multiple specialists of the same discipline. The same does not become possible in a task force. If large and complex projects are to be handled effectively by a task force, the specialists will have to be very senior in which case the task force is likely to declare independence of communication, with the result that the parent functional organization may be totally cut off. Since the task force will have scant regard for the functional department's policies and procedures, they will evolve something of their own. Also, if the duration of the project is long, the specialists deputed to the task force will forget their home department and with that whatever allegiance they ought to have for their functional homes will be lost. When this happens we have a new type of organization known as *totally projectized organization*.

Totally Projectized Organization

A totally projectized organization is an arrangement in which the project manager has total authority even regarding functional policies and procedures. There is no constraint whatsoever with respect to any function. The functional specialists have no one to notify. They will be carrying out what the project demands and the project manager instructs.

Many people compare this arrangement to a mini company, a totally autonomous organization in which the project manager is the chief executive. It will, necessarily, have divisions and departments headed by very senior functional specialists who can function independently without any support whatsoever. They would act on behalf of the project manager and would have authority delegated to them by the project manager for taking decisions in their area of competence.

Such an arrangement is obviously possible when the project is too large and complex or geographically so located that there is no way of managing it without granting autonomy to the team handling the project. The project manager for such a project will obviously be a very senior person to justify delegation of so much authority by the company. The project manager, in such an arrangement, will be required to carry out a lot of administrative functions besides his core project business. It would not be surprising to find the project manager spending more time in administrative matters than on the main business of the project in this type of arrangement.

Figure 3.8 shows a totally projectized organization. The difference between this arrangement and the one shown in Fig. 3.7 is not the mere elimination of dotted-line relationships but also the inclusion of personnel, accounts and many such functions which are not the project manager's immediate concern. Yet this arrangement may be justified for a project because of its size, complexity, location, importance to the company and also need for special treatment, particularly in case of a joint sector or collaborative project or if the

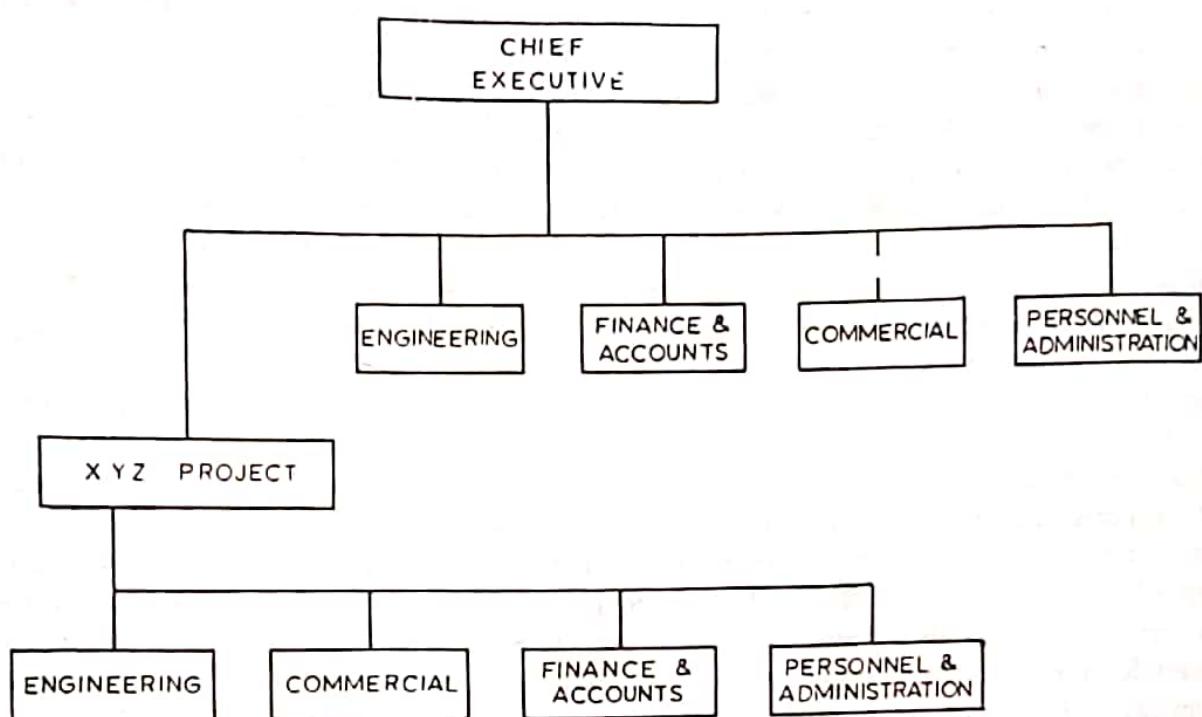


FIG. 3.8 Totally projectized organisation

financial institutions desire it to be so organized. The totally projectized arrangement may also be desirable if the company is executing only one gigantic project.

A matrix is also expected to work for very large and complex projects but, in practice, it adds its own complexity. A matrix is also effective for small but complex projects where many multi-disciplinary specialists are required for short durations. However, unless the number of such projects are many, a matrix arrangement would not be justified. So either total projectization or task force arrangement would appear to be the best arrangement for executing most projects. And in both these arrangements the project manager is delegated authority commensurate with the responsibility he is expected to undertake. Project objectives get primary attention in both these arrangements.

ACCOUNTABILITY IN PROJECT EXECUTION

The structuring of work and delegation of authority for execution of the project would not automatically ensure achievement of the objectives of the project. Authority empowers one to make decisions for results in relation to the work at hand. Hence, one who is delegated authority must take decisions and those decisions must produce results. But some individuals may not take decisions and also may not be concerned about results; delegation of authority to such individuals or agencies would be disastrous for the project. It is meaningless to delegate authority without ensuring that the individuals or agencies will strive for results. When an individual does so on his own he is said to be *responsible*. In such a case he commits himself morally to the achievement of the task whenever he undertakes an assignment or accepts delegation of authority. An individual can also be made responsible by being held *accountable* for results. When an individual assumes moral responsibility he holds himself accountable to his own conscience. But when he accepts responsibility for fear of withdrawal

of authority or sanctions of any other form for non-achievement of results, this type of responsibility can be classified as *contractual responsibility*.

Authority, therefore, accompanies responsibility and in the business world it has to be tied up with accountability. Everyone naturally clamours for authority but it should be delegated only if accountability is accepted. Authority devoid of accountability merely infests egos, causes hindrances and ultimately retrogrades progress of work.

When examined in the context of accountability, many of the organizational alternatives may not be found helpful for the achievement of the project objectives. Table 3.1 makes an analysis of the organizational alternatives discussed so far in the context of authority and accountability. It can be seen that except for arrangements 4, 5 and 6 no one, either singularly or collectively, can be held accountable for all the performance parameters of the project. For achieving project objectives, therefore, the above three arrangements are the only viable alternatives.

It can also be seen that except for arrangement 6, the accountability is shared. In arrangements 5 and 6 accountability for project performance rests squarely with the project manager—it is, of course, a different issue whether he would be able to withstand the pressure or not. Where there is a doubt, arrangement 6 cannot be conceived of. In case of arrangement 4, in view of the complexity of its operation, parties may not assume responsibility as desired and, therefore, cannot be held accountable. Arrangement 5 assumes full accountability and minimum operational complexity though the arrangement may not be cost effective. Thus, it is possible to choose an organizational arrangement by using accountability as the guiding factor.

CONTRACTS

The project charter and the organizational arrangement accords the project manager appropriate authority over the in-house resources. But not all projects can be executed with in-house resources and the project manager has to requisition extra-organizational resources for the execution of the project. When a project manager has to get things done with resources over which he has no direct authority, it becomes necessary to acquire the required authority in lieu of some considerations. Such an arrangement can be termed as a *contract* and the authority so acquired as *contractual authority*. If this authority is acquired in-house through a contract, then the process can be termed as *internal contracting*. All other contracts for the acquisition of authority can be termed as *business contracts*.

Business Contracts

A contract as such is an agreement between two or more parties in writing, to do or not to do certain things. Business contracts are those agreements which are enforceable at law. They are entered between two or more competent parties for a legal consideration which is usually payment in the form of money. For an internal contract the consideration is normally absent. Legally, of course, a contract can be valid even though there may not be any consideration, but then it is not a business contract.

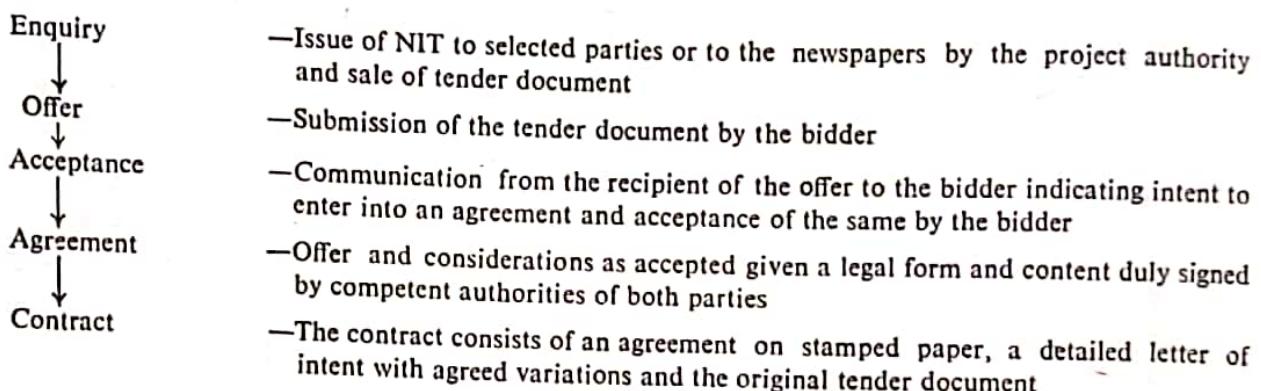
TABLE 3.1 Authority—accountability with various organization

S. No.	Type of arrangement	Authority			Accountability	
		Project Manager	Functional Manager	Project Manager	Functional Manager	
1.	Project manager as a staff	Does not make any decision for the project, collates and communicates information.	Decides what has to be done, how it has to be done, when and at what cost in their functional area.	Cannot be held accountable for any performance parameter of the project. Accountable for timely reporting.	Can be held accountable for individual functional performance. Cannot be held accountable for overall project time and cost.	Same as above.
2.	Consultant as a project manager	Does not make decisions, better systems, procedures, and guidelines for project implementation. Trains staff, monitors implementation and makes recommendations.	Same as above.	Cannot be held accountable for time and cost but can be held accountable for proper coordination.	Can be held accountable for functional performance of the project. Cannot be held accountable for overall project time and cost.	Same as above.
3.	Project management as a staff function	Decides on overall schedules to be followed and budgets to be provided but cannot direct staff for adherence to the same.	Decides what has to be done, how it is to be done, when it has to be done and at what cost in their functional area.	Cannot be held accountable for time and cost of the overall project but cannot be held accountable for technical performance.	Can be held accountable for time and cost of the overall project but cannot be held accountable for technical performance.	Can be held accountable for technical performance in their functional area.
4.	Matrix organisation	Decides on what is to be done, when it is to be and at what cost for the entire project. Can direct for adherence to the same.	Decides on how it is to be done in their functional area. Can direct implementation of above.	Can be held accountable for time and cost of the overall project.	Can be held accountable for time, cost and technical performance of the project.	Can be held accountable for adequacy of staffing both qualitatively and quantitatively for effective functioning of the task force. Cannot be held accountable for any performance parameter of the project.
5.	Task force	Decides what is to be done, when it is to be done, how it is to be done and at what cost for the entire project. Directs the entire project in all aspects of the project. Does not recruit,	Provides staff for task force and guidelines as to how the functions are to be performed in the task force. Can direct adherence to the guidelines.	Can be held accountable for task force and guidelines as to how the functions are to be performed in the task force. Directs the entire project in all aspects of the project.	Can be held accountable for task force and guidelines as to how the functions are to be performed in the task force. Directs the entire project in all aspects of the project.	Can be held accountable for any performance parameter of the project.

	train or involve in corporate administrative matters.	Decides everything for the project including corporate administrative matters. Authority matches with that of the chief executive of the company.	Is not involved in any decision making for the project.	Is accountable for all performance parameters of the project and for all administrative matters of the project organization.	Not accountable for anything related to the project.
6. Totally projectized organization					

A consideration, in the context of a business contract, is made in return for a specific promise contained in the offer of the promisor. In order to enter into a contract, there must first be an offer or proposal signifying the willingness of one party to do or abstain from doing something at the desire of the other party. The desire of the other party is expressed in the enquiry often known as Notice Inviting Tender (NIT) and the offer to carry out the services at certain terms is known as Tender.

The sequence of events resulting in a business contract are as shown below:



3 'R'S OF CONTRACTING

Contracting, whether it is for a consideration or otherwise, is an essential arrangement for getting work done in an environment where authority relationships and responsibility delineations are unclear or non-existent. It is said that contracting is practised even in a domestic environment where parents obtain desired behaviour from a child for a certain consideration. The same continues without our being aware of it in all our social relationships. Knowledge of contracting is, therefore, as much a basic requirement for day-to-day living as that of the three 'R's.

If one chooses not to over-play the legal aspects, contracting itself can be found to constitute the 3 'R's only. The 3 'R's in the case of contracting are: Responsibility, Reimbursement and Risk.

The first 'R' in a typical contract covers issues such as:

1. What to parcel out to the contractors and what to retain.
2. How to define the work parcels so that the contractors know their scope precisely and there is no overlapping, undefined, unallocated or ambiguous work areas.
3. What are the relevant performance parameters for fulfilment of which contractors must assume responsibility.

Collectively, the above are often referred to as scope of work. Schedule of work, technical specifications, scope drawings, special conditions of contract, responsibility of matrix and special write-ups in appropriate combinations are used to ensure clarity. Yet most problems in contracts arise due to improper definition of the scope of work and connected responsibility. It is easy to appreciate that if the parties have different understanding regarding scope of work and responsibility there will be utter confusion. This may even lead to charges of evasion of responsibility, extra claims, ill-feeling, strained relationships and, above all, delay and additional cost in the completion of the project.

Defining Responsibility

While one can easily appreciate the need for a clear definition of scope of work and responsibility, it does not become easily possible in practice. The reasons are technical as well as political. Technical problems apart, the owner may not like to define everything clearly in order to keep some flexibility with him to play with the scope of work. The contractor may also not be interested in a clear definition so that he can later make extra claims and earn disproportionately high reimbursement for any additional work. But it is in the interest of both the parties to keep ambiguities to the minimum.

A responsibility matrix shown in Fig. 3.9 indicates the possible arrangement for the sharing of responsibility. Figure 3.9 to 3.14 illustrate arrangements that can be made directly by the owner. Further sub-division will be required, and as one goes down to finer details more and more complexities will arise. We may later discuss how to deal with those complexities. It may be possible to divide the scope of work and responsibility in a number of ways. But such divisions are normally done as per established industrial practice.

S. No.	Scope of work	Responsibilities		
		Owner	Engineering Contractor	Third party
1.	Process design	✓	=	✓
2.	Basic engineering	=	✓	=
3.	Detailed engineering	✗	✓	✗
4.	Procurement services	=	✓	=
5.	Equipment supply	=	✓	✓
6.	Sub-contracting services	=	✓	✗
7.	Commissioning	✓	=	✓
8.	Project management	✓	✓	✗
9.	Construction management	=	✓	✗
10.	Financing	✓	✗	✗

Legend: ✓ Assume full responsibility
 ✗ Does not assume responsibility
 = May sometimes assume responsibility

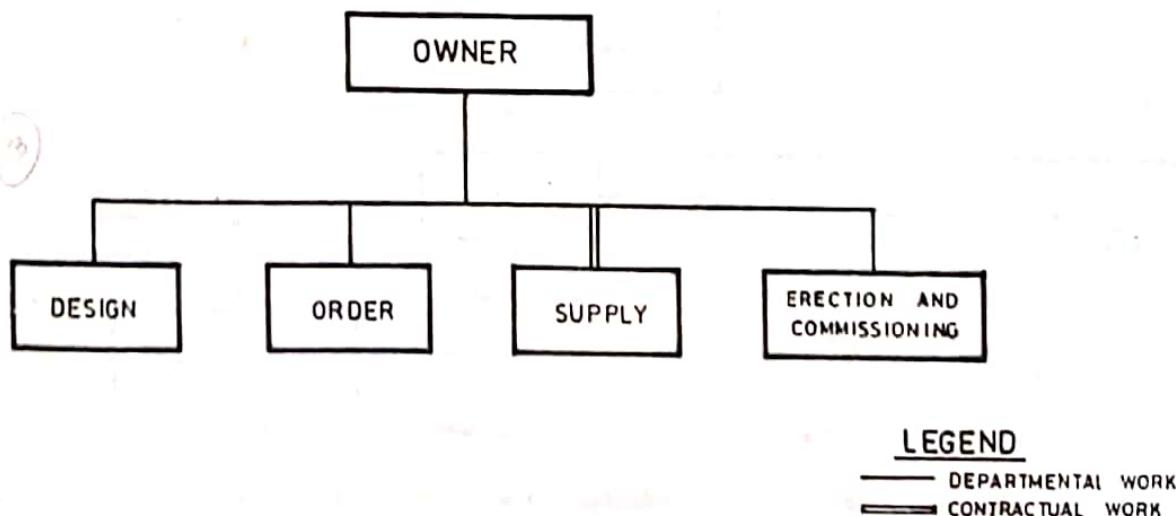


FIG. 3.9 Owner doing everything except manufacture of plant and machinery

Note: This mode is normally used for replacement, overhaul or limited expansion of an existing plant. Engineers from the plant design office and maintenance department normally carry out this work in addition to their routine responsibilities. Obviously, the project gets second priority and new technology and management practices are unlikely to be used. The project takes its own time and, while the apparent cost may be low, the real cost of the project inclusive of opportunity cost is always high.

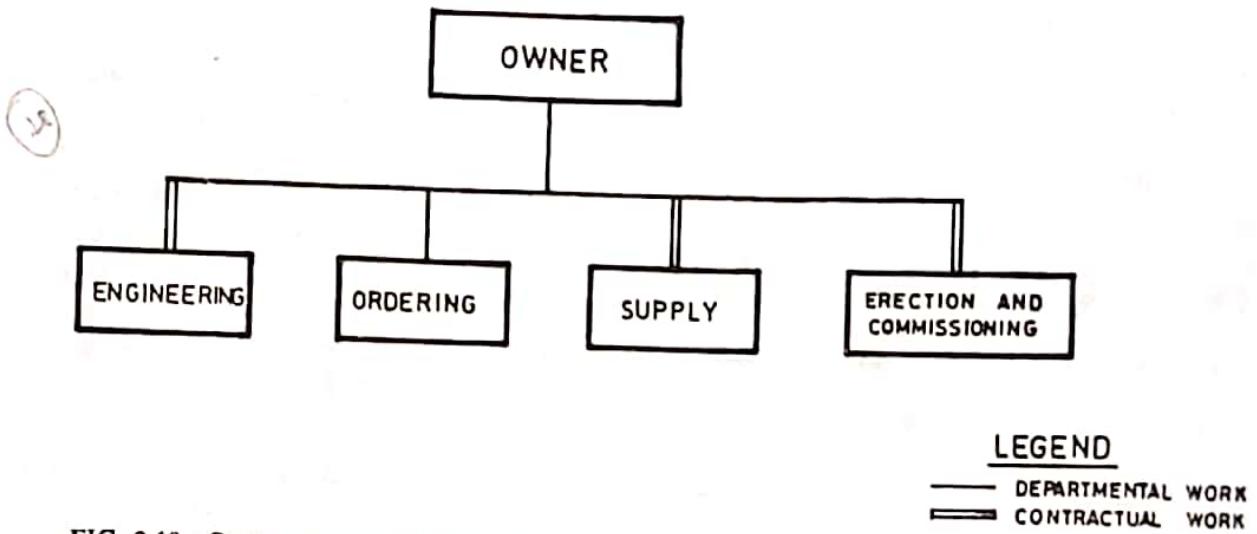


FIG. 3.10 Owner assuming the task of ordering and carrying out project management through contracts

Note: This is by far the most popular arrangement. The intention in such an arrangement is that the owner's team which will eventually be asked to take over the operation of the plant will keep the production interest uppermost in mind while implementing the project. This arrangement, however, ignores one basic fact that project management requires a different skill from that of management of production and, therefore, a project very often suffers due to non-availability of specialist project management skills.

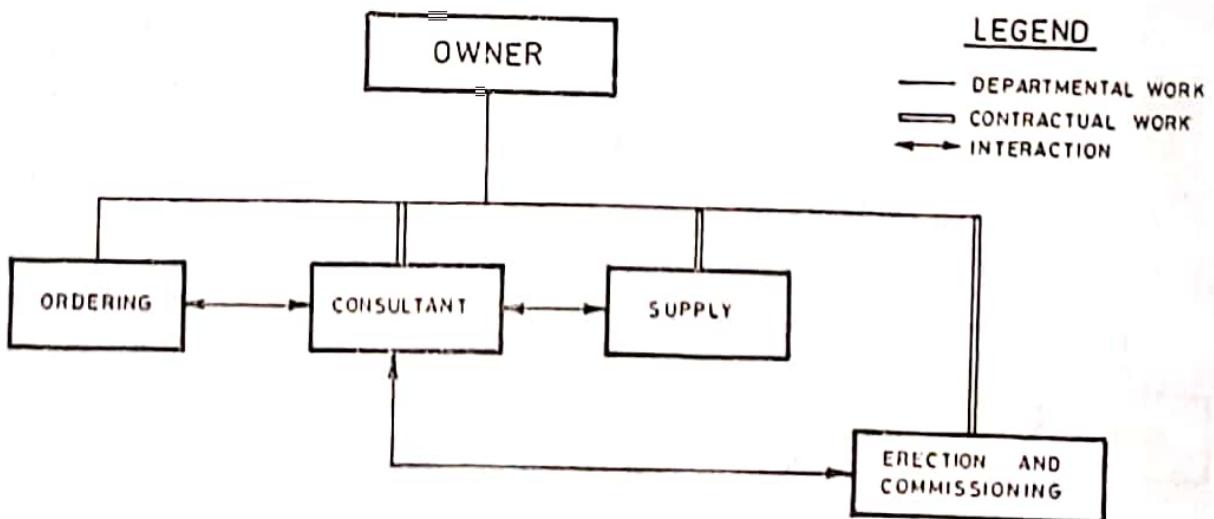


FIG. 3.11 Owner engages a consultant for engineering and project management services

Note: Most of the detailed engineering contractors who have interactions with vendors and contractors in their normal course of business offer project management services. Since the

detailed engineering contractor's performance is often a source of delay for others, owners may not get the best deal from this arrangement unless the consultant guarantees the time schedule and cost of the whole project.

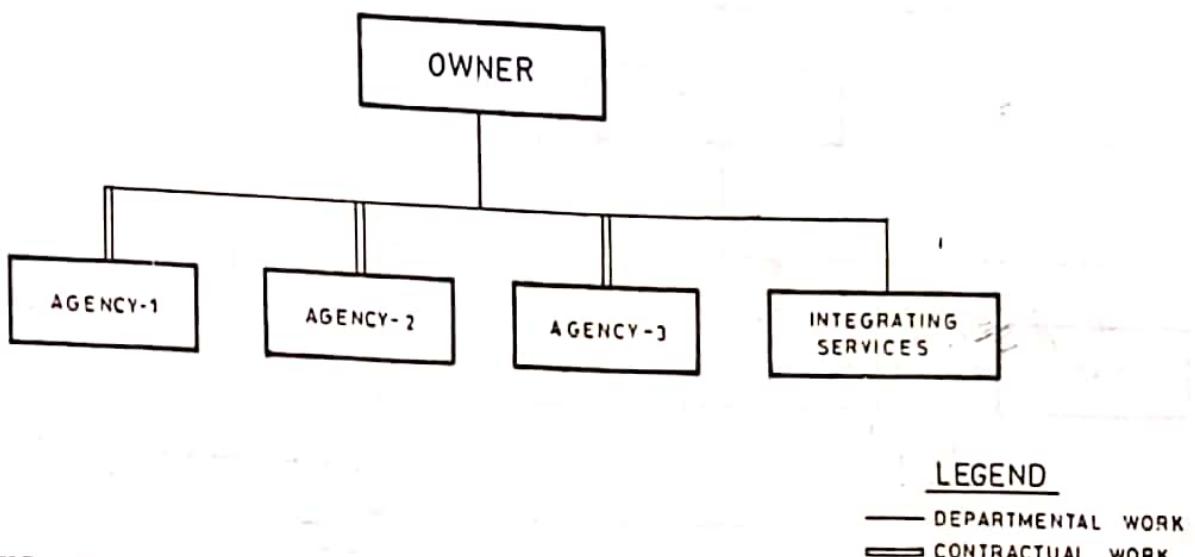


FIG. 3.12 Owner engages number of agencies for specified work packages inclusive of design, procurement, erection and commissioning

Note: This arrangement is aimed to reduce the interfaces to minimum and clearly apportion the responsibility for performance. But the owner, in this case, is required to take the entire responsibility for project management. Over and above this, the owner is also required to handle the areas which are common to all contractors and, thus, gets directly involved in execution like any other agency. In a modified arrangement, the owner offloads the integrating services to another agency.

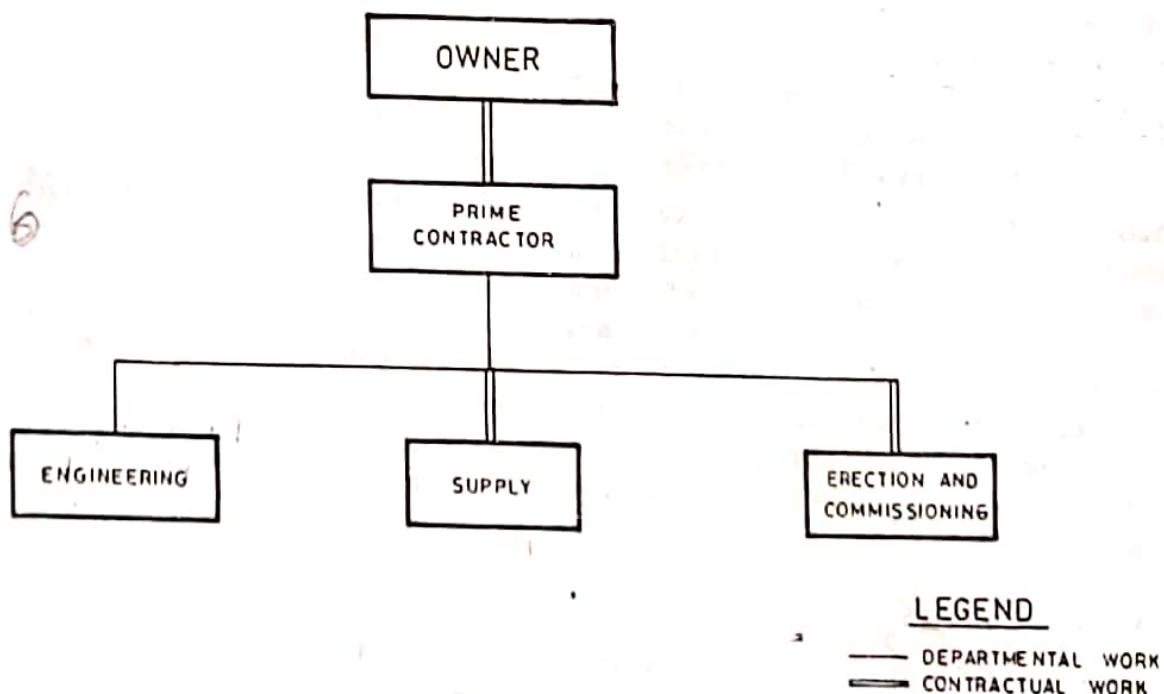


FIG. 3.13 Owner hands over the entire responsibility of project execution to a prime contractor

Note: The prime contractor, in turn, selects associates and sub-contractors to share the responsibilities of project implementation. Selecting a prime contractor is not only time-consuming but involves pressures of all kinds. The risk involved is also heavy, and the owner may not be able to introduce any change without incurring an exorbitant cost.

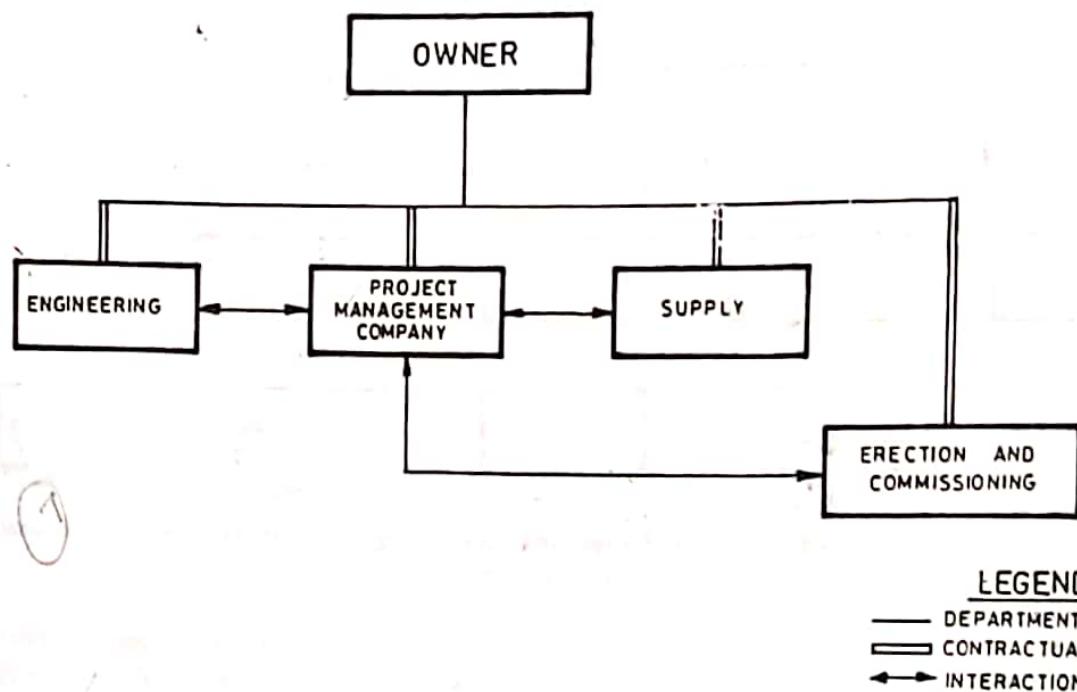


FIG. 3.14 Owner appoints a project management company for professional management of the project on behalf of the owner

Note: The project manager advises the owner on contracting plans and later manages the contracts in the best interest of the owner. The entire gamut of project management expertise is, however, available mostly with the prime contracting companies to whom the job of project management alone is not of much interest. In most cases consulting companies with few specialists are offering these services; consequently the owner is not getting the services one would normally expect from such execution arrangements.

According to industry practice, a certain cluster of responsibilities in a set pattern are considered for a contract. Each such pattern can be treated as a *type* of contract. Accordingly, there could be various types of contracts for any engineering construction project. Table 3.3 shows a dozen types of contracts which are normally used, but the list could be longer. It is possible to further sub-divide the contract, but if the division is carried too far or not done systematically it can create a tremendous problem of communication and co-ordination besides delay, buck-passing and inter-party quarrels. A small family is always considered to be a happy family, therefore, the lesser the number of contractors the better it is for the project.

The Turn-key Contract

The number could be drastically cut down and may even be reduced to one, if the contract is awarded on a turn-key basis. In a turn-key project a single contractor has complete responsibility to supply the owner a plant which is complete and ready for the owner to

operate by simply turning the key. Turn-key, thus, is an expression for the extent of responsibility that a contractor undertakes; it is not to be mixed up with the commercial and payment terms. Turn-key would not necessarily mean a fixed price contract, it is quite possible to enter into a turn-key reimbursable contract. This definition makes it possible for engineering consultancy organizations to undertake turn-key responsibilities for projects even without having capabilities of supply and finance. On the other hand, in a lumpsum turn-key contract a contractor offers the owner a complete plant for a single price.

Even when a turn-key contract is entered into, the process of dividing the work does not totally stop with the decision to go turn-key. It only reduces the number of agencies the owner is required to coordinate. The turn-key contractor, in turn, will be required to subdivide the work further as it is not possible to have all the capabilities required for a complex project under any single roof. If this division is not done systematically, the above mentioned problems will arise.

Work Packages, Systematic distribution of work becomes possible by dividing the entire project into work packages. A work package can be viewed as the smallest division of work where it still retains the multidisciplinary characteristics of a project. To identify work packages the whole project has to be broken down systematically into successive levels by using what is known as Work Breakdown Structure (WBS). We will discuss this technique in detail in the next chapter. Using work breakdown structure a plant will be broken down into units, units into systems and systems into work packages.

However, with this approach the work packages can only be roughly identified. A work package to be fully defined, will additionally require description of the total task involved after the contour of the package has been identified through the work breakdown process. Individually or several work packages combined together, may form a contract. It may also be necessary to divide the work package further into mono-functional work in case contractors with multi-disciplinary capabilities are not available or found to be very uneconomical.

Contract Planning /1

As has been seen, the number of contracts cannot be decided mechanically. The factors listed below may be considered while taking a decision on the number of contracts.

1. Speciality of the works
2. Location of the work site
3. Value of the contract
4. Availability of contractors
5. Need to accommodate local contractors
6. Need to obtain performance guarantee for a system from a single party
7. Concern for early completion
8. Concern for completion at minimum cost
9. Concern for top quality
10. Current work load of the contractor and capability of the contractors
11. Time schedule of the work
12. Political pressure

If it is a special type of work—such as design, supply or erection of the whole package

itself—it would be necessary to treat the item as a separate contract. Again the location of the work site may require the contract to be made either big or small, fabricated at shop or at site. If the value of the contract is small, large contractors cannot be attracted. On the other hand, if it is too large it may be beyond the capability of contractors available in the country.

A contract can be packaged only to the extent parties are willing to accept responsibility. If there is pressure to find work for local contractors, as is a common practice, contracts have to be planned differently. However, it should also be seen that in the process of division, the accountability for performance of any system still rests with a single party. It may be necessary both for obtaining system guarantee and also for elimination of time consuming coordination to assign multiple package to one party. In fact, though it may be possible to award the project at the cheapest cost by dividing it into too many small contracts, it should not be resorted to since such an arrangement may not be economical in the long run. The problem of coordination, in such a case, will not only delay the project inordinately, it may not allow the project to come up at all.

Sometimes quality consideration of a plant component may require it to be handled differently, ignoring time and cost considerations. It then becomes a case of specialised work. Even though there may not be any speciality, and even though originally it may have been planned to be a single contract, it may still be required to split the contract due to the workload of the contractor, his financial capability, etc. Again if the job schedule indicates a period of being comparatively full between two phases of work, it may be wise to split the contract.

Finally, the pressure that may come from various quarters to divide work or combine work with a view to either import or match capabilities available indigenously, inhouse or at site. In worst cases the intention may be to favour a particular party. No matter how much one may like to have no such constraint, it sometime becomes a practical necessity to divide packages or combine packages at the behest of external sources of power even though it may not be technically a sound proposition.

Since so many factors are to be considered, and since the matter is not entirely technical, an exercise is separately carried out to decide on the number of contracts. This exercise can be called *contract planning*. At the end of the exercise a document known as *tender list* may be formulated. The document must receive approval from all concerned not only to avoid belated changes but also to ensure that there is no gap, no overlap, no incongruity and the division is in the best interest of the project. Besides, a contract plan represents for external parties what an organization chart does for internal parties. It must, therefore, have the top management's approval.

It may sometimes be desirable to add time dimension to the tender list to convert it into a schedule known as tender schedule. Figure 3.15 shows the format for a tender schedule. The necessity of dividing the work, and the time span considered, can in that case be examined thoroughly. The document after approval can be passed on to the scheduling engineer as the basis for preparation of a detailed tender schedule. The tender schedule, however, covers only the broad scope of work; detailed scope of work will have to be defined in the tender document which the owner may issue to prospective contractors for bidding. We shall discuss the tender document in detail later in this chapter.

Types of Reimbursement

The second 'R' of a contract refers to the type of reimbursement and it is as important as

TENDOR	NAME OF TENDOR	SCOPE OF WORK/ RESPONSIBILITY	APPROXIMA- TE VALUE OF WORK RS LAKH	TIME SCHEDULE						
				J	F	M	A	M	J	J
1.	SOIL INVESTIGATION	PLANT AREA, NON-PLANT AREA & TOWNSHIP	1.0							
2.	SITE GRADING - 1	GRADING OF PLANT, NON-PLANT AND TOWNSHIP AREA, ROADS AND DRAINS, MICRO LEVELING OF SITE AND PRE-MIX CARPETING OF ROAD EXCLUDED	15.0							
3.	SITE GRADING - 2	MICRO LEVELING, PAVING PRE-MIX CARPETING OF ROADS	5.0							
4.	PLANT WATER SUPPLY	DESIGN, SUPPLY ERECTION AND COMMISSIONING OF THE TOTAL SYSTEM FROM RIVER BED TO PLANT AND TOWNSHIP OVERHEAD TANKS								

FIG. 3.15 Tender schedule

the first 'R'. Perhaps this 'R' is more important for the contractor than the owner. While the owner may refer to the responsibility to describe the contract arrangement, the contractor may choose to refer to it by the types of reimbursement such as lumpsum contract, item rate contract, etc. We shall, however, prefer to use responsibility as the basis for assigning any name to a contractual arrangement.

Table 3.2 describes the various arrangements for reimbursing a contractor for the services rendered by him. The choice of one system over the other is not always economic. Even if the owner may like to enter into a lumpsum arrangement, there are certain compulsions which may make him go for a cost-plus. Again, it may be paradoxical but true that cost-plus contracts often turn out to be more economical to the owner than the lumpsum contract from the point-of-view of the total project.

Lumpsum v. cost-plus In order to make a lumpsum offer a contractor would like to have all the details. If the details are not known he would like to build contingencies in his price to take care of the unknowns. It is this aspect of pricing that can make a lumpsum contract more expensive than a cost-plus contract.

On the other hand, if the work can be farmed out by the owner at a fixed price, the owner would know at a very early stage of the project his total liability and also if he is going to be within the approved budget or not. His anxieties to that extent will be less. With cost-plus contract, the owner would not have the advantage of knowing what the total cost is going to be till a very late stage. The owner will, therefore, be anxious all the time due to this uncertainty. Naturally, wherever possible the owner would like to go for a lumpsum contract.

The speciality of the cost-plus contract is the opportunity it provides to start work immediately, thus eliminating the need for detailed scope definition and preliminary engineering by the contractor in submission of his proposal. It allows flexibility to the owner to

TABLE 3.2 Types of reimbursement

S. No.	Types of reimbursement	Method of reimbursement
1.	Lump sum contracts	
1.1	Lump sum	Fixed price arrived at by way of competitive bidding.
1.2	Negotiated lump sum	A fixed price is negotiated with the contractor selected on consideration other than price.
2.	Cost plus contracts	
2.1	Cost plus per cent fee	(a) For services: Actual man hour \times rate = say A + % of A for overhead = say B, + agreed % (A + B) as fees + out of pocket cost at actuals. (b) For supply: Equipment costs at actuals + agreed % fee for service. (c) For turnkey project: Installed plant cost at actuals + agreed % fee for services.
2.2	Cost plus fixed fee	Fee component is fixed and not linked with other costs which will be reimbursed at actuals.
2.3	Cost plus with guaranteed maximum	Reimbursement to the contractor is on the basis of cost plus and % fee or fixed fee such that the total price does not exceed a predetermined amount. If the contractor incurred more cost than this figure to complete the work, some part of the extra cost will be borne by him. Same as above except if the final cost is lower than the target, some part of the saving will be passed on the contractor. In both 2.3 and 2.4 escalation clause must be included to protect the contractor from developments beyond his control.
2.4	Cost plus with guaranteed maximum and incentive (Also known as target cost contracts)	Contractor is reimbursed for his expenditures, measured in days or hours, at agreed rates per man hour or per man day without the total number of hours or days being fixed.
2.5	Fixed rate contract	A detailed schedule of items giving brief description of the work or supplies with approximate quantity is introduced in the contract, and the contractor offers a unit rate against each item. Rates may also be obtained against items not quantified. Payment is made against the aggregate of various quantities actually executed at rates quoted by the contractors. Beyond a certain % variation in the quantity specified in the schedule or total values of the contract, rates may require to be renegotiated.
3.	Item rate Contracts	Works on a cost-plus basis till scope of work can be defined and later converted to lumpsum.
4.	Convertible contracts	The contract in such cases may be divided into two parts. The parts where design parameter and/or quantities are frozen are put on lumpsum. For the balance parts where quantities may change during detailed design, item rates are invited from the contractor against schedule of item with no or very rough quantities.
5.	Hybrid contracts	
5.1	Lump sum + item rate	

(Contd.)

5.2 Lump sum + cost plus	Same as above except that where the details of the second part cannot be even roughly estimated the same can be put on cost-plus.
5.3 Lump sum + fixed rate	The lump sum portion may refer to supplies, design or for such scope of work which can be fully defined. For services like commissioning or construction supervision or for escalated period reimbursement may be made at an agreed fixed rate.

change his mind at any stage without being forced to pay exorbitantly. The owner can also upgrade his design, specification and quality of construction without any objection from the contractor.

But all the above flexibilities may not bring economic advantage for the project. In fact, it may not only cause extra expenditure on plant and machinery, but the completion of the whole project may also get delayed unless changes from the owner's side are controlled. Besides, it will also require lot of effort for the owner to control excessive expenditure which the contractor may resort to since he will now be spending the owner's money and not his own. In this arrangement the contractor does not have any incentive to reduce cost. In fact, if his fee is a per cent of the total cost, he stands to gain if the total cost increases.

Type of contract v. reimbursement It would appear from the above discussion that each mode of reimbursement has certain advantages and disadvantages. The industry practice for reimbursement against various types of contracts is given in Table 3.3, but any owner will choose his own arrangement. Clearly there is no economy in either of the modes; the economy has to be considered in the context of the total project and the environment. Much will depend on the state of development of the project, availability of contractors, criticality of the contract under consideration, ongoing economic activity and workload of the contractor besides the owner's in-house capability in deciding a particular course. However, the trend is clearly in favour of lump sum contracts.

TABLE 3.3 Type of contract vs reimbursement

S. No.	Type of contract	Possible type of reimbursement
1.	Process licensing contract	Lump sum
2.	Know-how contract	Lump sum
3.	Detailed engineering contract	Lump sum
4.	Project engineering contract	Lump sum + fixed rate
5.	Prime contract	Lump sum + cost plus
6.	System contract	Lumpsum
7.	Supply contract	Item rate
8.	Supply plus erection contract	Lump sum + fixed rate
9.	Construction/erection contract	Item rate
10.	Turnkey contract	Lump sum
11.	Project monitoring contract	Fixed rate
12.	Scheduling and monitoring contract	Lump sum
13.	Management contract	Lump sum
14.	Labour contract	Fixed rate

Risk Factor

The last 'R' of a contract refers to the risk factors. Both the owner and the contractors are so much concerned about this 'R', that most of the pages of a contract deal with only this matter. In fact, a contract is considered to be an instrument for transfer of risk from the owner to the contractor, and necessarily this should evoke some resistance from the contractor. The least that a contractor would do is to seek protection in one form or other. But while the contractor risks only his fee, the owner runs the risk of not having his plant at all. Naturally, the owner would seek more protection and would not like to take any risk against which he does not have adequate insurance. The insurance, however, cannot be always in the form of a financial insurance policy. Only small risks can be covered by insurance and a little more protection may be provided in the contract document. However, most of the risks are usually covered when contracts are awarded through a proven contracting process.

Risk and uncertainty Theoretically risks are associated with outcomes with which probability can be associated. In a construction project, neither the owner nor the contractor would be able to forecast the outcome in all cases. There is only a vague anxiety about the outcome which each of them apprehends may not be the best. But what it will eventually be, no one can know beforehand. Such a situation is usually termed as *uncertain*. As there are very few outcomes in a construction project which are certain, project management has to deal with only risks and uncertainties. In practice, therefore, no distinction is made between risk and uncertainty and the term *risk* may be considered to represent both risk and uncertainty.

Identification of risks Let us identify the risks which either the owner or the contractor may face. What the owner is not certain about and, therefore, considers as a risk may be any of the following.

1. Will the contractor be able to carry out the work as per specifications?
2. Can the work be completed within the quoted cost?
3. Will the plant perform at the required level?
4. Will the contractor stay on the job till its completion?
5. Will the contractor adhere to the time schedule?
6. Will the contractor meet the owner's requirements if they are changed at a later date?
7. Will the contractor cooperate with the owner and third parties?
8. Will the party submitting the tender back out when the contract is awarded to him?
9. Will the contractor leave behind liability for the owner to deal with in regard to his staff or third parties?
10. Will the contractor rectify defects discovered after he leaves the scene?
11. Does the contractor understand his intent fully and interpret the contractual terms as the owner would?
12. If the relationship does not click, what can happen?

The contractor, similarly, is also not certain about many things. In particular, he carries the following risks in relation to the owner and would seek protection against the same in the contract:

1. Will the owner terminate his work before completion of the same?
2. Will the owner make payments promptly?

3. Will there be work hold-up and imposed idleness for him?
4. Will the owner carry certain minimum obligations regarding his work?
5. Will the owner change the scope of work upsetting his plan and estimates?
6. Will the work quantities and specifications change significantly affecting his rates?
7. Will he get reimbursed for extended work duration?
8. Will there be price escalation and will he get compensated for the same?
9. Will he be penalized for failures beyond his control?
10. Will there be smooth cash flow?
11. Will the owner provide workforce and other inputs in time for uninterrupted progress?
12. Will the plant or equipment be taken over when ready?
13. Will the owner honour extra claims?
14. Will there be difference in interpretation of his scope and responsibilities with the owner?
15. Can he make a profit?

General conditions of contract (GCC) To ensure that parties entering into a contract are appropriately protected against risks, various professional institutions have devised standard contract documents. It is advisable for the parties concerned to take up one of these documents for framing their contract rather than making one of their own. When published conditions of contract are used, they are likely to be more neutral than those made in-house which may be slanted either towards the owner or the contractor depending on who drafts the same. Use of published conditions of contract will also avoid unnecessary discussions which normally follow when in-house drafted conditions of contract are used.

The Institution of Mechanical Engineers (IME), U.K. has developed such forms for various types of work which have international acceptance. These forms, in fact, have been developed jointly by three institutions:

1. The Institution of Mechanical Engineers (IME)
2. The Institution of Electrical Engineers (IEE)
3. Association of Consulting Engineers (ACE)

In India the National Association of Consulting Engineers (NACE) has also developed standard forms which could be used for this purpose.

A model form usually contains various clauses which specify the exact position in respect of various risk factors. The various clauses in IME GCC for supply and erection of plant and machinery are reviewed below.

Clause 1 Definition of terms—This clause is supposed to remove the communication gap the parties may have in the interpretation of certain terms used in drafting a contract.

Clause 2 Contractor to inform himself fully—This clause is included to ensure that the contractor has examined the relevant data before bidding.

Clause 3 Security for due performance—This clause enables the owner to obtain security deposit or bank guarantee not exceeding 15% of the contract price at the start of work as an insurance for faithful performance of the contract.

Clause 4 Expenses of agreement—This clause names the party which will bear the expenses of the agreement.

Clause 5 Drawings—This clause specifies the drawing and the time by which these have to be submitted by the contractor to the owner for his review, approval or information. The clause also specifies the time the owner should take in giving approval.

Clause 6 Mistakes in information—This affixes total responsibility on the contractor for whatever drawings he produces inspite of the owner's review or approval. The owner is held responsible for only the basic information he supplies to the contractor.

Clause 7 Assignment—This clause prevents parting of responsibility by the contractors without the owner's written approval.

Clause 8 Sub-letting—This clause prevents sub-letting of the contract without the owner's consent in writing. It also reiterates that the contractor cannot absolve his responsibility in the event of sub-letting.

Clause 9 Patent rights, etc.—This clause insulates the owner as also the contractor against any infringement of patent rights of third party by either of the parties.

Clause 10 Manner of execution—This clause emphasizes strict adherence to specifications and ensures owner's satisfaction in supply of plant and machinery by the contractor.

Clause 11 Contractor's equipments, labour, etc.—This clause specifies the contractors responsibility for the supply of material and labour for completion of the work. This clause also stipulates necessary action to be taken by the contractor for the safety of others in relation to his work.

Clause 12 Electricity, water and gas—This clause stipulates the terms for getting electricity, water and gas for execution of the work.

Clause 13 Lifting equipment—This clause stipulates the terms for getting the use of lifting equipment for execution of the work.

Clause 14 Variation in scope—This clause stipulates the rights of the owner to make variations in scope till the contract price is exceeded by 15% after which the contractor's written consent will be needed.

Clause 15 Underground works—This clause specifies the reimbursement of extra cost that may be incurred by the contractor for facing rocks, rocky soil, etc. during excavation which was not anticipated earlier.

Clause 16 Contractor's default—This clause specifies that in the event of the contractor's inability to execute the work with due diligence and expedition the owner may off-load the work to another contractor and charge the contractor the excess cost incurred in getting it completed through another contractor.

Clause 17 Bankruptcy—This clause specifies that in the event of the contractor becoming insolvent the owner can terminate the contract.

Clause 18 Inspection, testing and rejection of plant—This clause specifies the owner/engineer's right to inspect the main contractor's plant and equipment and also his sub-contractor's work. The clause also stipulates advance notice by the contractor and any action the contractor may take in case there is no response from the owner.

Clause 19 Delivery—This clause prohibits delivery of plant and machinery to site without

the owner/engineer's written authorization. In the event of being prevented from making delivery despite giving adequate notice to the owner/engineer for inspection, there shall be addition to the contract price to be determined in like manner as in the case of valuation of variations. Also, the clause relieves the contractor of responsibility for storage and erection beyond a stipulated period of delay.

Clause 20 Access to and possession of site—This clause stipulates timely access to site and provision of approach thereof.

Clause 21 Vesting of plant and contractor's equipment—This clause stipulates that all plant and machinery including the contractor's equipment when brought to site becomes the owner's property and cannot be removed without the owner/engineer's written permission.

Clause 22 Engineer's supervision—This clause requires that all the activities shall be carried out under the direction and to reasonable satisfaction of the engineer.

Clause 23 Engineer's representative—This clause permits the engineer to delegate any of the power vested in him but only in writing.

Clause 24 Clerk of works—This clause requires contractors to extend reasonable facility to clerks of works.

Clause 25 Engineer's decision—As per this clause the contractor is required to work in accordance with the engineer's decision. The contractor can ask for written instructions and may even dispute it in writing, but this will not relieve him of his obligation to proceed with the work as per the engineer's instructions.

Clause 26 Contractor's representatives and workmen—This clause requires the contractor to employ representatives at site and communicate to the engineers the name of at least one competent representative to whom the engineer can issue instruction. On the engineer's notice in writing, in case of misconduct, incompetence or negligence, the contractor will remove his representative.

Clause 27 Liability for accidents and damage—This clause specifies the contractor's responsibility in respect of completed works not taken over by the owner. In the event of loss or damage occasioned by the contractor, it shall be made good at his cost. The contractor shall indemnify the purchaser in respect of all damage or injury occurring to any person or property before the works are taken over.

Clause 28 Limitation on contractor's liability—This clause mentions that except as provided in the clause '*delay in completion*' for the deduction of liquidated damages for delay, the contractor shall not be liable to the purchaser by any indemnity or by reason of any breach of contract for loss of use (whether complete or partial) of the works or of profit or of any contract that may be suffered by the purchaser.

Clause 29 Defects prior to taking over—This clause specifies that the engineer will give notice if any work done by the contractor is not in accordance with the contract and the contractor shall make good the defects at his own cost.

Clause 30 Extension of time for completion—This clause stipulates that if by reason of any industrial dispute or any cause beyond the reasonable control of the contractor, and

TENDERING AND SELECTION OF CONTRACTOR

It can, however, be appreciated that the GCC only lists provisions to protect against uncertainties arising in the normal course of work. Thus, a contract presumes that the parties entering into a contract are competent and normal. But if, for instance, the contractor selected for a specific work is not competent technically, financially or managerially, then the risks will multiply several times. This uncertainty must, therefore, be resolved at the first instance. A well laid out procedure for prequalification of contractors and tendering can resolve this uncertainty. Such a procedure is known as *tendering procedure*.

A tender may be defined as an offer to carry out certain work or supply certain material or services in accordance with clearly detailed descriptions and conditions. The tendering procedure deals with prequalification of contractors, preparation of tender documents, mode of floatation of enquiry, receipt of tender, guidelines for evaluation of tenders and selection of contractor. We will discuss this in some details in the context of reducing risk and uncertainty in the execution of a project.

Prequalification of Contractors

For prequalification of tenders, notifications are issued in the press, at embassies, etc. as appropriate giving details such as name of the purchaser/engineer, outline of the project, enquiry issue and tender submission dates, instructions for applying for prequalification and submission date for the contractor's prequalification data.

Normally, a prequalification document, issued on request to a contractor seeks information on the organization, experience in the intended type of work, availability of resources like managerial, technical, labour and plant, and also asks for financial statements. The contractor desirous of prequalification responds to the questionnaire and such details as may enable his qualification.

The data supplied by the contractors are evaluated for the preparation of a short list. The purchaser or his engineer would normally select a contractor for inclusion in the short list of tenders if:

- Q 1. He has had similar experience earlier and his performance reports for previous contracts are satisfactory.
- 2. His past turnover and present financial commitments indicate no constraint on fund availability for execution of the proposed contract.
- 3. He has the necessary infrastructure, adequate technical manpower, construction equipment and his present commitments would not prevent him from executing the proposed assignment satisfactorily.
- 4. His credibility in terms of his associates and associations with other agencies including foreign agencies, job performance and relationship with customers are sound.

After evaluation, the short-listed contractors are informed about their selection and their confirmation obtained as to whether they will submit the tender.

Preparation of Tender Documents

A tender document is prepared by the purchaser/engineer in as detailed and clear manner as possible to define the technical requirements of the work involved as also the responsibi-

lities which the purchaser and contractor will have to share between themselves. A good tender document will include the following:

1. Letter of invitation to tender
2. Instruction to tenderers
3. General conditions of contract
4. Technical specifications
5. Special conditions of contract
6. Scope drawings
7. Bill of quantities
8. General information about site
9. Form of tender

Professional institutions like IMechE have also standardized the tender form. A tender form for supply and erection of plant and machinery may cover the following items in the order listed below:

1. Prices
2. Programme
3. Terms of payment
4. Conditions of contract
5. Contract price adjustment
6. Validity

The document is then issued to the short-listed contractors for submission of their tender.

Receipt of Tenders

The tenderers may make a request to visit the site. Normally, the purchaser/engineer accompanies the tenderers to the site and provides further information. There may be a pre-bid conference to clarify the various issues to the tenderers. Supplementary queries can be clarified through correspondence till the due date for the bidding. On the due date bids may be opened in front of the tenderers present. The purchaser/engineer will announce and record the names of tenderers and prices including prices of alternative tenders. They would also announce and record the names to tenderers, if any, who are disqualified due to late submission.

Evaluation of Tenders

The tenders are evaluated from technical, commercial, contractual and managerial angles. Contractor's confirmation or clarifications are sought on various matters which either do not conform the tender requirements or those that have not been offered by the contractor. The correspondence may reduce the points of disagreement but a post-bid meeting often cannot be avoided. Normally, separate meetings are held with each contractor to obtain clarification and also to bring all the offers in line with the tender requirement.

The actual evaluation process includes checking the acceptability of the offer against technical specifications, management specification and various commercial and contractual terms and conditions. An adjusted contract price will be arrived at in each case. Normally, the lowest bidder who is also technically and managerially acceptable is awarded the contract.

Agreement An agreement is now to be signed on a stamped paper. The form of agreement is probably the most standardized document. The form of agreement refers to the various documents which will together form the contract. The accompanying documents normally are:

1. Original tender papers comprising the conditions of contract, specifications, dates, drawings and other relevant information.
2. Schedule of rates/prices, including those for engaging workmen, equipment, etc. for contingent works required during execution not envisaged at the tendering stage.
3. A list of deviations from original tender stipulations as mutually agreed upon between the purchaser and the contractor after discussions.
4. Other relevant attachments.

Form of Guarantee Finally, whenever required, a guarantee from sureties in the following standard form of IMechE may be asked from the contractor as an insurance against uncertainties in dealings with the contractor.

By an agreement dated and made between the purchaser and the contractor the parties enter into a contract as stated below:

Now we hereby jointly and individually guarantee to the purchaser punctual, true and faithful performance and observance by the contractor of the covenant on his part contained in the said agreement and undertake to be responsible to the purchaser, his legal personal representatives, successors or assigns as sureties for the contractor for the payment by him of all sums of money losses, damages, cost charges and expenses that may become due or payable to the purchaser from the contractor in consequence of default in the performance. Nevertheless, the total amount to be demanded shall not exceed 15 per cent of the contract price.

This guarantee shall not be revocable by notice and our liabilities as sureties hereunder shall not be impaired by any alterations made or agreed to in the general conditions of contract.

TEAM BUILDING

The greatest uncertainties, however, arise not from the scope of work or from the type of contract arrangement. The real source of uncertainties are the people themselves, irrespective of whether they have been brought into the project by contract arrangement or through in-house organizational arrangement. It can be easily appreciated that if the people are concerned more about their rights, which a contract aims to protect, and not about their responsibilities, which as we have discussed before, are more a matter of self-realization, then the project is not likely to show the best results.

A contract, at best, can record the responsibilities that parties must assume, stipulate the incentives or disincentives for fulfilment or non-fulfilment of the same but it cannot make them put the interest of the project before or at least at par with their own self-interest. Yet, it is absolutely necessary that the interest of the project becomes of primary concern for all the participants in a project, or else they will not be able to work together. When all the participants of the project put the project interest before their personal motives or at least at par with their self-consideration, and work hand-in-hand for the good of the project then the participants can be said to be working as a team.

If the people can be forged into a team, there would not be any need for an elaborate contract. On the other hand, any amount of contractual clauses cannot make a team and conse-

quently, cannot avoid all sorts of uncertainties that may arise due to the same. No amount of effort is, therefore, too much to build a team for the execution of a project.

Seven 'C's for Team Building

Team building, perhaps, is the most difficult part of organizing human resources. Every one would agree that team work is essential, but most of the time it is left to the superior leadership to achieve the same. However, the matter need not be left entirely to chance and a model can be conceived which can enable even a lesser leader to build a good team. The 7 'C's for team building are in keeping with the 7 turns which two unfamiliar individuals take in a Hindu marriage before becoming a team. The 7 'C's are:

1. Conceiving
2. Concurring
3. Committing
4. Communicating
5. Coordinating
6. Counselling
7. Controlling

The first step in team building is to *conceive* the inter-relationship model that will become operative for the realization of the project objective. The second step is to make the members *concur* on this. Only when they concur it would be possible to obtain *commitments* from them. There must be all-round *communication* of the requirements of the inter-relationship model and the commitments made by each member. There would be shortfalls in meeting commitments, but a total *coordination* must exist so that a shortfall anywhere in the line does not upset the team balance. The defaulting member must be *counselled* to exercise more self-control so that he makes an all-out effort to meet his commitments. Finally, when self-discipline does not work and the smooth and harmonious working is being affected, *control* must be exercised to bring the working in line with the requirements.

Thus, the emphasis in team building is not on competition but on cooperation. Members are made to see the whole perspective and also how they stand in relation to each other and the whole. Decisions are taken all the time keeping this entirely in view and members are encouraged to cooperate with each other for the common good which, they must have a firm conviction, will in turn spell good for them even individually.

SUMMARY

This chapter has dealt with organization of human resources and contracting for implementation of a project. The topics that have been covered in this chapter are:

1. Delegation—what to delegate, when to delegate and how to delegate.
2. Project manager's authority.
3. Project organization—project manager as a staff to chief executive, consultant as a project manager, project management a specialized staff function, matrix organization, task force organization and totally projectized organization.
4. Accountability in project execution.
5. Contracts—Internal contracting and business contracts